40. (Amended) The printhead of Claim 36, wherein the ink flow path for each nozzle subgroup includes an opening or set of openings through the thin film layer and through the substrate, and wherein each nozzle of a nozzle subgroup supplied with ink via said opening or set of openings.

41. (Amended) The printhead of Claim 36 the nozzles comprising the array are arranged in subgroups of nozzles, each subgroup comprising at least two nozzles, each subgroup fed with liquid ink through a corresponding ink flow path isolated from other nozzles of the array by the barrier layer/orifice structure, further comprising printhead electronics that provide firing pulses to the drop generators such that no two nozzles of each nozzle subgroup are fired sequentially.

44. (Amended) The printhead of Claim 36 wherein the nozzles of each nozzle column have a pitch of 600 nozzles per inch (npi).

## REMARKS

The Examiner is thanked for the careful review of the application as set out in the outstanding office action. Reconsideration of the application is respectfully requested.

A marked up version of the changes made to the application is attached hereto.

### Claims Rejections - 35 USC 103

Claims 1-37 and 39-44 stand rejected as being unpatentable over Steinfield et al. ("Steinfield," 5,984,464) in view of Wu et al. ("Wu," 6,280,021). The rejection is respectfully traversed, on the grounds that a prima facie case of obviousness has not been established, and the applied references do not teach or suggest the claimed invention.

Claim 1 as amended is drawn to a fluid ejecting printhead, comprising:

a substrate having a surface;

a columnar group of drop generators formed on the surface that are arranged into subgroups each comprising at least two drop

generators, each subgroup being fluidically isolated from other subgroups on the surface; and

printhead electronics that provide firing pulses to the drop generators such that no two drop generators in the same subgroup are activated in sequence.

The applied references do not teach or suggest such a printhead, including, by way of example and without conceding that the references provide the teachings alleged by the Office, a printhead including "a columnar group of drop generators formed on the surface that are arranged into subgroups each comprising at least two drop generators, each subgroup being fluidically isolated from other subgroups on the surface." The Examiner does not contend that Steinfield discloses this feature. However, the Examiner states that Wu discloses a "subgroup including a chamber and at least or two firing resistors (FIG. 1, element 14a) being fluidically isolate ink through the fluid feed holes from the fluid supply (FIG. 1, element 12) to the fluid feed slot (column 2, lines 54-62)." Applicants respectfully disagree that Wu provides the missing teaching.

Wu in FIGS. 1-2 describes what is said to be a conventional thermal inkjet printhead chip structure. A plurality of firing chambers 14 are not formed into subgroups, each subgroup being fluidically isolated from the other subgroups. Each firing chamber is fed from reservoir 12. FIGS. 3A-3B are said to describe a printhead wherein each firing chamber 30 is connected to an ink reservoir 36 by an ink slot 42, with each firing chamber isolated from other firing chambers and the reservoir 36 isolated from other ink reservoirs and connected only to firing chamber 30. Wu does not describe a printhead having a columnar group of drop generators formed that are arranged in subgroups, each comprising at least two drop generators, as recited in Claim 1.

Similar considerations apply to Claim 12, which is drawn to a system for delivering fluid, which includes a printhead substrate having a surface on which is formed a columnar group of drop generators that are arranged in subgroups, each of the subgroups including more than one drop generator, the subgroups being isolated from each other on the surface.

Nor, for similar reasons, do the references teach or suggest Claim 22, which is drawn to a method of controlling a printhead, comprising:

providing a printhead having a substrate surface with a columnar group of drop generators formed on the surface that are arranged into subgroups each comprising more than one drop generator, each subgroup fluidically isolated from other subgroups on the surface; and

providing electrical signals to the printhead to activate the drop generators to eject fluid drops such that no two drop generators in the same subgroup are activated in sequence.

Claim 30 is drawn to an ink jet printhead comprising:

a substrate;

a barrier/orifice structure supported by the substrate and defining an array of nozzles arranged in a plurality of nozzle columns and an array of firing chambers in correspondence with correspondence with the array of nozzles;

the nozzles comprising each column of the array arranged in subgroups of nozzles, each subgroup comprising at least two nozzles, each subgroup fed with liquid ink through a corresponding ink flow path isolated from other nozzles of the array by the barrier layer/orifice structure.

Neither reference teaches or suggests a printhead having a nozzle arrangement as set out in Claim 30, wherein the nozzles comprising each column are arranged in subgroups of nozzles, each subgroup comprising at least two nozzles, each subgroup fed with liquid ink through a corresponding ink flow path isolated from other nozzles of the array by the barrier layer/orifice structure.

Claim 36 is drawn to an ink jet printhead comprising:

a substrate having an ink feed slot formed therein;

a thin film layer disposed on a surface of the substrate, the thin film layer defining a plurality of firing resistors, the thin film layer having a plurality of ink feed openings formed through to provide respective ink paths through the substrate and thin film layer;

a barrier/orifice structure disposed on the thin film layer, the structure defining an array of nozzles arranged in a plurality of nozzle columns and an array of firing chambers in correspondence with correspondence with the array of nozzles, the nozzles comprising the

array are arranged in subgroups of nozzles, each subgroup comprising at least two nozzles, each subgroup fed with liquid ink through a corresponding ink flow path isolated from other nozzles of the array by the barrier layer/orifice structure;

the firing resistors being arranged in correspondence with the firing chambers;

the barrier/orifice structure further comprising a continuous rib portion extending between adjacent first and second ones of the plurality of nozzle columns to fluidically separate the first and second ones of the nozzle columns.

The applied references do not teach or suggest a printhead as recited in Claim 36, including for example, the recited barrier/orifice structure.

Because the applied references do not teach or suggest each limitation of the rejected claims, including for example the limitations described above, the rejection under Section 103 should be withdrawn.

## CONCLUSION

In view of the foregoing, the application is in condition for allowance. Such favorable reconsideration is solicited.

Respectfully submitted,

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## VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

1. (Amended) A fluid ejecting printhead, comprising:

a substrate having a surface;

a columnar group of drop generators formed on the surface that are arranged into subgroups each comprising at least two drop generators, each subgroup being fluidically isolated from other subgroups on the surface; and

printhead electronics that provide firing pulses to the drop generators such that no two drop generators in the same subgroup are activated in sequence.

12. (Amended) A system for delivering fluid, comprising:

a printhead substrate having a surface on which is formed a columnar group of drop generators that are arranged into subgroups, each of the subgroups including more than one drop generator, the subgroups being fluidically isolated from each other on the surface;

a printhead control electronics electrically coupled to the printhead, the printhead control electronics proving firing signals to the printhead such that no two drop generators in the same subgroup are activated in sequence.

22. (Amended) A method of controlling a printhead, comprising:

providing a printhead having a substrate surface with a columnar group of drop generators formed on the surface that are arranged into subgroups each comprising more than one drop generator, each subgroup fluidically isolated from other subgroups on the surface; and

providing electrical signals to the printhead to activate the drop generators to eject fluid drops such that no two drop generators in the same subgroup are activated in sequence.

36. (Amended) An ink jet printhead comprising:

a substrate having an ink feed slot formed therein;

a thin film layer disposed on a surface of the substrate, the thin film layer defining a plurality of firing resistors, the thin film layer having a plurality of ink feed openings formed through to provide respective ink paths through the substrate and thin film layer;

a barrier/orifice structure disposed on the thin film layer, the structure defining an array of nozzles arranged in a plurality of nozzle columns and an array of firing chambers in correspondence with correspondence with the array of nozzles, the nozzles comprising the array are arranged in subgroups of nozzles, each subgroup comprising at least two nozzles, each subgroup fed with liquid ink through a corresponding ink flow path isolated from other nozzles of the array by the barrier layer/orifice structure;

the firing resistors being arranged in correspondence with the firing chambers;

the barrier/orifice structure further comprising a continuous rib portion extending between adjacent first and second ones of the plurality of nozzle columns to fluidically separate the first and second ones of the nozzle columns.

40. (Amended) The printhead of Claim [39] 36, wherein the ink flow path for each nozzle subgroup includes an opening or set of openings through the thin film layer and through the substrate, and wherein each nozzle of a nozzle subgroup supplied with ink via said opening or set of openings.

41. (Amended) The printhead of Claim [39] 36 the nozzles comprising the array are arranged in subgroups of nozzles, each subgroup comprising at least two nozzles, each subgroup fed with liquid ink through a corresponding ink flow path isolated from other nozzles of the array by the barrier layer/orifice structure, further comprising printhead electronics that provide firing pulses to the drop generators such that no two nozzles of each nozzle subgroup are fired sequentially.

44. (Amended) The printhead of Claim [33] 36 wherein the nozzles of each nozzle column have a pitch of 600 nozzles per inch (npi).